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**IN THE UNITED STATES PATENT AND TRADEMARK OFFICE**

In re application of:

BERTEZ et al.

Serial No. 09 / 755,053

Filed January 08, 2001

Group 1725

Examiner Jonathan J. Johnson

**Method and apparatus for the laser cutting of stainless steel, coated steel,
aluminum and aluminum alloys with a bifocal optical component**

DECLARATION UNDER RULE 132

Assistant Commissioner for Patents
Washington, D.C. 20231

Sir :

I, Olivier MATILE, a citizen of France, residing at 6/12 rue Achille MARTINET 75018 Paris, France ,
declare that :

I am currently employed by L'Air Liquide S.A, 75 quai d'Orsay 75321 PARIS cedex 07, France.

I graduated as an engineer from Sorbonne Paris IV University and ESSA Welding Technological School.

I have over 15 years experience in the field of thermal welding and cutting, and especially in laser beam
welding and cutting.

I am named inventor or co-inventor in several US and European patents or pending patent applications in
this field.

In particular, I am one of the inventors of US patent n° 09 / 755,053 (Bertez et al).

I am aware of the fact that most of the Claims of our US patent application n° 09 / 755,053 have been
rejected as being unpatentable over Nielsen (US 6,175,096) in view of Faerber (WO 96/23624).

Further, I am aware of the Declaration made by Mr. Nielsen on December 2003.

I fully agree with Mr Nielsen's Declaration as I also consider that the rejection of our Claims is not justified
in view of the teaching of the previous patents of Nielsen and Faerber.

Hence, I decided to submit this Declaration in support of the pending claims of our patent application
because, in my opinion, as of the priority date of the present patent application, a person of ordinary skill in

the art would not derive our invention from the prior art, especially from a combination of Nielsen and Faerber...

Generally speaking, our invention deals with a laser cutting process of stainless or coated steels, and aluminum and its alloys by means of a multi-focal optical objective, such as a bifocal lens, used in combination with a precise binary gas mixture containing nitrogen and oxygen, the proportion of nitrogen being of 90 vol. % or more.

In the spirit of the present invention, the term "combination" is very important.

Indeed, on a technical point of view, there is a really "synergetic effect" that takes place when laser cutting a material using a bifocal lens combined with a nitrogen/oxygen mixture according to our invention, when compared to a cutting operation using the same gas mixture with a mono-focal lens or, in contrast, using a pure gas (such as N_2 or O_2) with a multi-focal lens.

When I and the other inventors worked on the multi-focal laser cutting technique, we made a lot of tests with pure gases and bifocal lenses as taught also by Nielsen's document.

We obtained good cutting results but we noticed, in some cases, in particular on aluminium, coated steels and stainless steels, some insufficiencies : low cutting speed, too high gas consumption, not optimal cut quality.

In a first step, we tried to find a solution in modifying the parameters of the laser device. However, this led to poor results in terms of improvements.

Then, in a second step, we had the idea of modifying the gas composition and using a N_2/O_2 mixture containing a least 90 vol.% of nitrogen. In this case, we obtained very good and surprising results as, as explained in our patent specification, the cutting speed and gas consumption were notably improved, whereas as the cutting quality was not decreased.

These results were very surprising as we did not expect, before doing such tests, to obtain such improvements of the laser cutting process.

Personally, I think that there was no incentive for a skilled artisan to combine Nielsen and Faerber's teachings for solving the problem of the present invention (see above) and to use a N_2/O_2 gas mixture with at least 90% of nitrogen in combination with a multi-focus lens.

Indeed, as clearly explained by Mr. Nielsen in his Declaration, Nielsen's patent only discloses the use of multi-focus lens with pure nitrogen for laser cutting high pressure stainless steel or with pure oxygen for laser cutting mild steel plates.

Personally, I fully share this analysis.

Further, regarding Faerber (ie WO'624), I can say that, even if this document discloses the use of nitrogen/oxygen mixtures for laser cutting various materials, it is always only in combination with a



classical mono-focal lens. In other words, this document does not concern the use of multi-focal lenses, such as bi-focal lenses, for laser cutting various material.

However, a skilled artisan well knows that the 'technical behaviour' of a multi-focal lens is very different from the one of a mono-focal lens, especially due to the repartition of energy in the thickness to be cut, which is different in both cases.

Indeed, it is possible with a multi-focus lens and using pure nitrogen to increase the cutting speed thanks to the simultaneous action of the first focal point focalised on the upper surface and, in the same time, to avoid any dross formation on the rear surface of the plate to be cut, thanks to the focalisation of the second focal point inside the material.

In contrast, with a mono-focal and using nitrogen as the cutting gas, it is compulsory to focalise the unique focal point on the lower surface for avoiding any dross formation, which compulsorily leads to a speed decreasing, even when using a gas mixture of nitrogen and oxygen as the cutting gas.

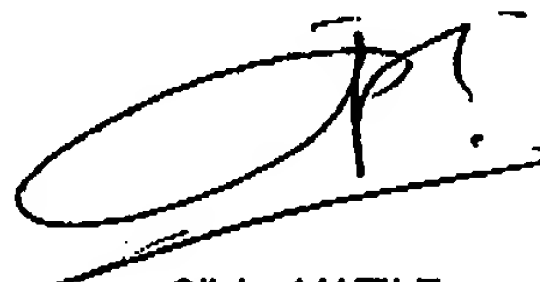
Hence, as the focal points are not focalised in the same manner in both cases, the energy of the laser beam is transmitted in a different way to the plate to be cut.

Actually, even if the multi-focal technology was known with pure nitrogen as the cutting gas, the 'idea' of the present invention was to "boost" the technical possibility of multi-focus lenses combining the specific performances of such particular kind of lenses with a specific binary gas mixture containing nitrogen and oxygen, in order to take advantage of the exothermically action of oxygen with iron and hence to obtain improved cutting performances, which are not reachable with a mono-focal lens even with the same kind gas mixtures, without increasing the gas consumption or decreasing the cut quality.

As a consequence, I think that a skilled artisan would not have combined, without hindsight, Nielsen with Faerber as they deal with different technologies, i.e. bifocal lens used with only pure gases versus mono-focal lens used with mixed gases, as also correctly emphasized by Nielsen in his Declaration.

And I further declare that all statements made herein of my own knowledge are true and that all statements made on information and belief are believed to be true, and further that these statements were made with knowledge that wilful false statements and the like so made are punishable by fine or imprisonment, or both, under §1001 of Title 18 of United States Code and that such wilful false statements may jeopardize the validity of the application or any patent issuing thereon.

Date : March 16, 2004



Olivier MATILE